Journal of Surgical Oncology 1999;71:269–272

Paratesticular Desmoplastic Small Round Cell Tumor: Case Report and Review of the Literature

JELENA ROGANOVICH, MD,[1] GIANNI BISOGNO, MD,[1]* GIOVANNI CECCHETTO, MD,[2] EMANUELE S.G. D'AMORE, MD,[3] AND MODESTO CARLI, MD[1]

[1]*Division of Hematology/Oncology, Department of Pediatrics, University of Padova, Padova, Italy*

[2]*Division of Pediatric Surgery, Department of Pediatrics, University of Padova, Padova, Italy*

[3]*Pathology Institute, University of Padova, Padova, Italy*

Desmoplastic small round cell tumor (DSRCT) is a rare neoplasm mainly affecting young males and typically located in the abdomen. Prognosis is generally very poor. We report a rare case of paratesticular DSRCT in a 17-year-old boy, presenting with an isolated left scrotal mass. The patient had an excellent outcome after complete surgical resection of the tumor and adjuvant multi-agent chemotherapy. DSRCT should be included in the differential diagnosis of small round cell tumors of the paratesticular region in adolescents and young adults. Tumor resection and chemotherapy may be beneficial for these patients. Our experience and a review of the literature suggest that DSRCT located in the paratesticular region may have a better prognosis than its more frequent abdominal counterpart.

J. Surg. Oncol. 1999;71:269–272.

KEY WORDS: desmoplastic small round cell tumor; scrotum

INTRODUCTION

Desmoplastic small round cell tumor (DSRCT) was recognized as a distinct clinicopathologic entity a few years ago [1]. It is a rare neoplasm that mainly affects adolescents and young adults, with a male–female ratio of 4:1, and typically occurs in the abdomen as a large mass with regional and distant metastases. Microscopically, the tumor is characterized by an abundant desmoplastic stroma surrounding nests of small cells. A polyphenotypic differentiation is evident on immunohistochemical studies and a specific translocation, t(11,22)(p13;q12) has been described [2,3,4,5].

Despite aggressive treatment, survival rates for patients with DSRCT remain disappointing [6]. We describe a case of paratesticular DSRCT in an adolescent with a good outcome after complete surgical resection and multi-agent chemotherapy.

CASE REPORT

A 17-year-old boy, previously in good health, was admitted to a local hospital in February 1993 with a 2-year history of a left scrotal mass that seemed to have grown markedly during the previous 2 months. Fever, weight loss, anorexia, and other systemic symptoms were denied. Physical examination revealed a hard, painless, left scrotal mass at the inferior paratesticular site, of about 2 × 2 cm. Laboratory work-up, including a complete blood count, serum electrolytes, glucose, renal and liver function tests, tumor markers, and urine analysis were normal. A paratesticular cyst was suspected. The patient underwent surgery via scrotal incision and resection of the mass involving the left paratesticular soft tissue. Macroscopically, two firm, whitish yellow nodules were found, measuring 3 × 2 × 1 cm and 0.9 × 0.5 cm, with a smooth margin. There were areas of necrosis on the cut section. Microscopic examination suggested a neoplasm of the small round blue cell tumor family and, to be more specific, a rhabdomyosarcoma. The patient

*Correspondence to: Gianni Bisogno, MD, Dipartimento di Pediatria, Divisione di Oncoematologia, Università di Padova, via Giustiniani, 3-35128 Padova, Italy. E-mail: moebius@child.pedi.unipd.it

Accepted 31 March 1999

was then referred to our hospital for further evaluation and treatment.

Revision of the original slides disclosed a tumor composed of sheets and islands of round cells surrounded by an abundant desmoplastic fibrovascular stroma. The individual cells had round nuclei and scant basophilic cytoplasm. Mitotic figures were elevated. The larger sheets had undergone central necrosis. Immunohistochemical studies demonstrated a strongly positive "dot like" pattern for both desmin and vimentin, and a diffuse and strong cytoplasmic immunoreactivity to the low-molecular-weight keratin antibodies AE1 and Cam5.2. There was focal cytoplasmic positivity for chromogranin, neuron-specific enolase, and epithelial membrane antigen. The tumor cells were PAS-negative and did not immunoreact to S100 protein, smooth-muscle actin, synaptophysin, or myoglobin. These morphological and immunohistochemical findings are diagnostic of a DSRCT. Cytogenetic and molecular analyses were not performed because no fresh tissue was available.

The staging work-up on chest, brain, and bones was negative, but computed tomography of the abdomen showed an 8-mm solid perisplenic nodule.

Because the first surgical operation was considered inadequate, inguinal orchiectomy and hemiscrotectomy were performed to ensure microscopically complete resection of the tumor. Histological examination revealed residual neoplastic tissue involving the left epididymis. An exploratory staging laparotomy was also performed, but neither abdominal organ involvement nor adenopathy were detected. Microscopic examination of the perisplenic nodule revealed an accessory spleen, with no evidence of the disease.

Considering the particularly aggressive nature of this neoplasm, adjuvant chemotherapy was administered according to the Italian protocol for soft tissue sarcoma, RMS 88. The treatment consisted of nine courses of IVA (ifosfamide, 3 g/m^2, days 1 and 2; vincristine, 1.5 mg/m^2, day 1; and actinomycin-D, 1.5 mg/m^2, day 1) at 3-week intervals. No radiation therapy was administered.

At the last follow-up (May 1998), the patient was well and with no evidence of disease more than 5 years after diagnosis.

DISCUSSION

DSRCT is a rare tumor of uncertain histogenesis which should be distinguished from the other childhood small round cell tumors, e.g., rhabdomyosarcoma, Ewing family tumors, neuroblastoma, and lymphoma [1,2,3].

DSRCT typically presents with a large abdominal mass that is widely disseminated at the time of diagnosis. There is often extensive regional spread to lymph nodes and peritoneal seeding. Metastases may be present in the liver, lung, and bone.

Microscopically, DSRCT has a characteristic appearance of sharply demarcated islands and cords of mitotically active small cells embedded in a dense desmoplastic stroma. These features can not be appreciated when the material is obtained by fine needle aspiration, so open biopsy is needed [1,2,7].

Immunohistochemical staining reveals a distinct polyphenotypic pattern consisting of the coexpression of epithelial (cytokeratin, epithelial membrane antigen), mesenchymal (vimentin, desmin), and neural (neuron-specific enolase) markers. All these findings distinguish it from other small round cell tumors [7,8].

Cytogenetic studies of DSRCT have demonstrated a unique chromosomal abnormality, t(11,22)(p13,q12). The breakpoint in this translocation includes the Ewing sarcoma gene (EWS) on the 22q12 and the Wilms tumor gene (WT1) on the 11p13 locus [4,5].

Although the abdomen is the most frequent primary site, other locations have occasionally been described [9–11].

We reported on an adolescent who complained of a long history of progressive enlargement of a left testicular mass. Suspecting a benign lesion, an incomplete resection through a scrotal incision was done. After surgery, a diagnosis of rhabdomyosarcoma was suggested but a review of the material established the definitive diagnosis of DSRCT.

A primary re-excision was necessary because of the unsuitable initial surgical approach, and residual tumor was found in the resected specimen. Because of the aggressive nature of this neoplasm, the patient underwent multi-agent chemotherapy and a laparotomy. This is a more aggressive approach than is used for rhabdomyosarcoma which, according to the Italian protocol, requires no laparotomy and a shorter chemotherapy without alkylating drugs (using vincristine and actinomycin for 22 weeks).

Most cases of intra-abdominal DSRCT reported in the literature run an aggressive course. In general, the disease is ultimately resistant to multimodal therapy, with a median survival time of 17 months [6].

According to data from the literature and our own experience, the prognosis for patients with paratesticular DSCRT may be better. In fact, out of 10 published cases of paratesticular DSRCT [7,12–15], 4 were alive with no evidence of disease 2.5 to 3 years after diagnosis at the time of being reported (Table I). This compares with only 7 survivors of the 99 patients with abdominal DSRCT reviewed by Kretschmar and coworkers [6]. Multidrug chemotherapy, including cyclophosphamide, etoposide, antracycline, vincristine, and cisplatin was administered to six patients with paratesticular DSRCT, and in three cases (case numbers 2, 3, and 8), a response was reported. Two patients received intensive chemotherapy followed by bone marrow or peripheral blood stem cell

TABLE I. Previously Reported Cases of Paratesticular DSRCT*

Case no.	Age (year)	Presentation	Other tumor locations at diagnosis	Treatment	Site of relapse and time from diagnosis	Follow-up	Reference
1	22	Long history of progressive testicular enlargement	Lungs, left supraclavicular retroperitoneal and inguinal LN	Orchiectomy Not specified multidrug CT	Not reported	DOD 17 months	12
2	26	Scrotal mass	Not reported	Orchiectomy, CT (CDDP, VP16)	Para-aortic LN	AWD 12 months	7
3[a]	?	Testicular mass	—	Orchiectomy, CT (CPM, VP16, Epi, CDDP) followed by high dose Carbo/VP16/IFO + stem cell support	Lung, bone, mediastinal and retroperitoneal LN	NED, 32 months	13
4	17	Intrascrotal mass × 3 months	—	Orchiectomy	Not reported	Lost	14
5	28	Painless intrascrotal mass of unknown duration	Cervical LN	Orchiectomy, CT (CDDP, Doxo, CPM)	Cervical LN, 7 months	DOD 16 months	14
6	32	Epididymitis 5 months prior to scrotal mass	Retroperitoneal LN	Orchiectomy	Not specified	Lost	14
7	26	Testicular pain	Multiple LN not further specified, lung	Orchiectomy, CT not specified and BMT	—	NED 2.5 years	14
8	28	Intrascrotal mass	Lung	Orchiectomy, CT (CPM, Doxo, VCR; after relapse: IFO, VP16)	Pulmonary mets, 2 years	NED 3 years	14
9	37	Testicular mass	—	Orchiectomy	Retroperitoneal LN, 3 years	Lost	14
10	21	Painless testicular mass	—	Orchiectomy, CT (IFO, Carbo, VP16, VCR, CPM, Doxo)	—	NED 33 months	15

*LN, lymph nodes; CT, chemotherapy; CDDP, cisplatin; VP16, etoposide; CPM, cyclophosphamide; Epi, epirubicin; Carbo, carboplatin; IFO, ifosfamide; Doxo, doxorubin; VCR, vincristine; BMT, bone marrow transplantation; DOD, died of disease; NED, no evidence of disease; AWD, alive with disease.

[a]In case no. 3, the treatment described was administered at relapse and the patient obtained a complete, prolonged remission.

infusion and they are both alive with no evidence of disease.

In our case, the role of the chemotherapy could not be assessed, since the child had no measurable disease at the time of starting therapy. However, the localized stage of the disease at the time of diagnosis and the complete surgical removal of the tumor are believed to have played an important role in the excellent outcome.

This report highlights the importance of including DSRCT in the differential diagnosis of paratesticular tumors in adolescents and young adults. Histologically, it should be distinguished primarily from rhabdomyosarcoma, which is more frequent and has a better prognosis. Immunohistochemical, cytogenetic, and molecular studies of tumor specimens contribute to the differential diagnosis. Inguinal orchiectomy should be performed in all cases, as recommended for all suspected malignant tumors of the testis. When a diagnosis of DSRCT is obtained, an extensive staging work-up must be conducted and intensive multidrug chemotherapy seems to be required [16].

A greater awareness of this disease among pathologists, oncologists, pediatric surgeons, and biologists will greatly help to guide the design of more effective therapy for this rare, but highly aggressive malignancy.

REFERENCES

1. Gerald WL, Rosai J: Case 2. Desmoplastic small cell tumor with divergent differentiation. Pediatr Pathol 1989;9:177–183.
2. Crombleholme TM, Harris BH, Jacir NN, et al.: The desmoplastic round cell tumor: A new solid tumor of childhood. J Pediatr Surg 1993;28:1023–1025.
3. Layfield LJ, Lenarsky C: Desmoplastic small cell tumors of the peritoneum coexpressing mesenchymal and epithelial markers. Am J Clin Pathol 1991;96:536–543.
4. Sawyer JR, Tryka AF, Lewis JM: A novel reciprocal chromosome translocation t(11;22)(p13;q12) in an intraabdominal desmoplastic small round-cell tumor. Am J Surg Pathol 1992;16:411–416.

5. Argatoff LH, O'Connell JX, Mathers JA, et al.: Detection of the EWS/WT1 gene fusion by reverse transcriptase-polymerase chain reaction in the diagnosis of intra-abdominal desmoplastic small round cell tumor. Am J Surg Pathol 1996;20:406–412.
6. Kretschmar CS, Colbach C, Bhan I, Crombleholme TM: Desmoplastic small cell tumor: A report of three cases and a review of the literature. J Pediatr Hematol Oncol 1996;18:293–298.
7. Ordonez NG, el-Naggar AK, Ro JY, et al.: Intra-abdominal desmoplastic small cell tumor: A light microscopic, immunocytochemical, ultrastructural, and flow cytometric study. Hum Pathol 1993;24:850–865.
8. D'Amore ES, Ninfo V: Soft tissue small round cell tumors: morphological parameters. Semin Diagn Pathol 1996;13:184–203.
9. Parkash V, Gerald WL, Parma A, et al.: Desmoplastic small round cell tumor of the pleura. Am J Surg Pathol 1995;19:659–665.
10. Murray JC, Minifee PK, Trautwein LM, et al.: Intraabdominal desmoplastic small round cell tumor presenting as a gastric mural mass with hepatic metastases. J Pediatr Hematol Oncol 1996;18: 289–292.
11. Tison V, Cerasoli S, Morigi F, et al.: Intracranial desmoplastic small-cell tumor. Am J Surg Pathol 1996;20:112–117.
12. Prat J, Matias-Guiu X, Algaba F: Desmoplastic small round-cell tumor. Am J Surg Pathol 1992;16:306–307.
13. Farhat F, Culine S, Lhommé C, et al.: Desmoplastic small round cell tumors: Results of a four-drug chemotherapy regimen in five adult patients. Cancer 1996;77:1363–1366.
14. Cummings OW, Ulbright TM, Young RH, et al.: Desmoplastic small round cell tumors of the paratesticular region. Am J Surg Pathol 1997;21:219–225.
15. Furman J, Murphy WM, Wajsman Z, Berry AD: Urogenital involvement by desmoplastic small round-cell tumor. J Urol 1997; 158:1506–1507.
16. Kushner BH, LaQuaglia MP, Wollner N, et al.: Desmoplastic small round-cell tumor: Prolonged progression-free survival with aggressive multimodality therapy. J Clin Oncol 1996;14:1526–1531.